

REVIEW OF THE MICROBIOLOGICAL
QUALITY OF THE BEACHES IN THE CITY
OF OTTAWA AREA

Strathcona, Mooney's Bay, Brantwood
& Brighton on the Rideau River-Britan-
nia and Westboro on the Ottawa River

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A REVIEW OF THE MICROBIOLOGICAL QUALITY OF THE
BEACHES IN THE CITY OF OTTAWA AREA

Strathcona, Mooney's Bay, Brantwood and Brighton
on the Rideau River - Britannia and Westboro on
the Ottawa River

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SUMMARY

Bacterial data since 1958 and 1970 data were examined to assess the recreational water quality at six City of Ottawa area beaches. Rainfall over the 1970 season and other pertinent information was also reviewed. OWRC recreational water criteria and the Ottawa-Carleton Regional Area Health Unit recommended limits were used in this assessment.

In 1970, Mooney's Bay and Britannia beaches met OWRC criteria although historically these beaches, particularly during the period of 1966 to 1968, were severely polluted. Using the Health Unit standards, these beaches were of unacceptable water quality. Westboro and Brantwood beaches only marginally met OWRC objectives during individual months of 1970 but failed to meet the Regional Health Unit's limits. Historically Westboro beach has been of relatively good quality while Brantwood beach was severely polluted since 1962. It was evident that intensive monitoring used to restrict recreational activity would be needed to avoid hazardous bathing conditions.

Brighton and Strathcona beaches historically have had polluted water quality and continued to show this trend in 1970 data when both Health Unit and OWRC objectives were considered. Elimination of polluting influences could restore water quality.

(ii)

Rainfall increases parametric counts tenfold within one to two days following precipitation bringing water quality levels at these beaches to the unacceptable level. The pollution caused by bathers on weekends and holidays during periods of intensive use was not assessed in past surveys and can be considered a source of pollution which would further deteriorate the water quality to the unacceptable level.

It is recommended that an effort be made to evaluate bathing water quality using an objective and fully defined set of criteria. This should be fully discussed with the regional and local Health Units.

Based only on these facts, understanding that they must be supported by a sanitary survey to have complete validity, these beaches are hazardous for recreational use.

Introduction

The following is a discussion of the pollution of Strathcona, Westboro, Britannia, Brantwood, Mooney's Bay and Brighton beaches based strictly on bacterial data available from OWRC files, reports, the Ottawa-Carleton Regional Area Health Unit and from the District Engineer. Information regarding sampling locations, written standards used by the local health unit, maps of the area and method of sampling was also requested. Apparently written standards and method of interpretation used by the Regional Area Health Unit was not available other than the information appearing below. This is a paragraph that appears on the bottom of a Regional Health Unit compilation of Rideau River swimming areas. It reads as follows:

"Recommended Limits

Water designated for Primary Contact Recreation. Not more than 10% of samples in a selective sampling program to exceed 100 Faecal Coliforms per 100 ml".

Since no more information regarding the application of this "standard" is available, 10% of "a selective sampling" can take on several meanings. It would perhaps be sufficient here to interpret it as indicating 10% of the year's samples. However, it cannot be too strongly recommended that this matter be discussed with the Health Unit so that a written

method of doing a beach survey designed to take sufficient samples and have results interpreted in a "standard" manner be uniformly and objectively applied. OWRC Water Quality Criteria should be discussed with the Health Unit with a recommendation that these be used.

The only information available regarding sampling method indicated all samples were taken five (5) feet from shore about nine (9) inches below the water surface. It was thought that more information together with location would allow a sorting of results into groups to permit comment with respect to inshore and offshore quality. In some cases when three samples were taken each sampling day (Westboro 1970, June 4, 11, 15, etc.), a pattern showing that one result was lower than the other two seemed to emerge suggesting the possibility of a station further from shore in deeper water. Therefore, all data had to be considered similar and were grouped accordingly. No other information was available.

OWRC criteria using geometric means (GM) of 1000 total coliforms (TC) and 100 fecal coliforms (FC) per one hundred milliliters of sample were used to assess the water. A sanitary inspection of the sites will of course shed light as to sources of pollution and point out other hazards that the review of a listing of microbiological data can not do.

Total coliform and fecal coliform data were available and while OWRC criteria considers data from both tests, it should be remembered that results from either test exceeding the suggested limit indicates an unacceptable condition. Information based on less than 10 sample results can only be considered as roughly indicative of a trend and is less reliable.

In 1970, samples were collected from mid-May until August 31. Although sampling was variable in May, three samples were collected on each day of sampling of the beaches with the exception of Strathcona beach where two samples per sampling day were collected. The majority of samples were taken in between Monday and Thursday and none were collected on weekends. The conditions, existing on weekends when the bathing load is heaviest, must therefore be considered worse than the weekday data will define. It is recommended that sampling times be extended to consider these periods of greatest use and hazards.

Meteorological data were obtained in an effort to better explain high bacterial counts. It appears in Graph #I.

Geometric means (GM) of yearly and monthly data used to average values. Confidence limits of these means at the 95% level, were used as an aid to compare monthly means with each other and with the OWRC criteria.

RIDEAU RIVER BEACHES

Mooney's Bay Beach

This beach has been polluted for bathing purposes in 1964 and 1966 through to 1969 (Table XI). In 1967 the fecal coliform geometric mean soared to 1,570.7/100 ml when it was at its highest. A marked improvement occurred between 1969 and 1970, acceptable bathing conditions were restored. During 1970 the means (Table XII) were well below the safe bathing level although in August the upper 95% confidence limit of the mean increased to 133.2 FC/100 ml suggesting marginal pollution.

In five of the nine recent years this beach was polluted. Although the 1970 data show an acceptable improvement, the August data suggest potential hazards that should be found and constantly monitored to be used to restrict activities at this beach.

The Health Unit's data (Table XIII) indicate that Mooney's Bay beach has exceeded the "more than 10% of samples exceeding 100 FC/100 ml guideline" in the last three years.

Mooney's Bay is the furthest upstream beach and was less subjected to pollution than the lower river beaches. This was the general pattern with the data as far back as 1962. This beach comparatively showed the best water quality of all the beaches in this review.

MOONEY'S BAY BEACH

TABLE XI - Yearly Data 1962 to 1970.

Year	Geometric Mean per 100 ml	
	Total Coliforms (No. of samples in brackets)	Fecal Coliforms
1962	59.2 (10)	20.9 (10)
1963	145.7 (10)	5.9 (10)
1964	401.1 (8)	96.1 (9)
1965	188.0 (7)	29.7 (8)
1966	270.2 (9)	104.2 (9)
1967	2,654.3 (13)	1,570.7 (13)
1968	591.9 (35)	107.2 (35)
1969	336.5 (173)	118.6 (173)
1970	132.4 (90)	47.5 (92)

MOONEY'S BAY BEACH

TABLE XII - Monthly 1970 Geometric Means.

Month	Geometric Mean per 100 ml		
	Total Coliforms (No. of samples in brackets)	Fecal Coliforms	
May	276.3 (7) *		36.1 (9)
June	137.3 (28)		42.5 (28)
July	91.5 (33)		40.8 (33)
August	173.9 (22) **		77.0 (22) **

* excluding two 1,100+ total coliform values

** excluding 80+ total coliform and 80+ fecal coliform.

Brighton Beach

Brighton beach has been badly polluted since 1962 (Table VII) and both coliform and fecal coliform means have approached or exceeded the criteria each year through 1970. Alarmingly high counts were recorded in 1967 and 1968 (means of 2,419.3 and 3,205.8 fecal coliforms/100 ml respectively). The parametric densities fell markedly between 1968 and 1969 remaining nevertheless above the FC objectives. This suggests that an attempt may have been made to control or eliminate some sources of contamination which was maintained in both 1969 and 1970.

The constantly unacceptable fecal coliform levels over the 1970 season (Table VIII) showed a hazardous bathing water quality. June through August FC means exceeded or approached marginal levels. There was no question that Brighton beach was grossly and steadily polluted. Recreational use should be restricted.

Since 1968 the Health Unit's recommended limits have been grossly exceeded. (Table XIII). In 1970, 53.5% of the samples were higher than 100 FC/100 ml.

Brighton beach rivaled the last downstream beach - Strathcona - for the worst water quality for recreation.

BRIGHTON BEACH

TABLE VII - Yearly Data 1962 to 1970.

Year	Geometric Mean per 100 ml	
	Total Coliforms (No. of samples in brackets)	Fecal Coliforms
1962	822.5 (8)	277.1 (8)
1963	412.3 (7)	99.2 (7)
1964	1,546.7 (4)	520.8 (4)
1965	3,019.9 (6)	1,371.1 (7)
1966	849.7 (8)	613.6 (8)
1967	4,571.1 (10)	2,419.3 (10)
1968	6,636.8 (13)	3,205.8 (13)
1969	385.5 (17)	123.3 (17)
1970	317.6 (70)	110.6 (70)

BRIGHTON BEACH

TABLE VIII - Monthly 1970 Geometric Means.

Month	Geometric Mean per 100 ml		
	Total Coliforms (No. of samples in brackets)	Fecal Coliforms	
May	319.4 (6)		24.5 (6)
June	365.4 (26)		145.7 (26)
July	367.6 (29)		125.0 (29)
August	131.6 (9)*		91.8 (9)*

* two 8000+ total coliform and fecal coliform counts per 100 ml are excluded.

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Brantwood Beach

In 1962, 1964, 1965 and 1967 & 1968 (Table IX), Brantwood was grossly polluted showing fecal coliform means ranging from 209 to 891/100 ml of water. Between 1968 and 1970 the means were considerably reduced suggesting once again that there may have been an effort to check upstream pollution. This, however, was only marginally successful because in the summer 1970 season (Table X), the fecal coliform means hovered close to the hazardous level (82.7, 99.8 and 94.0 FC means/100 ml). The upper 95% confidence limits all exceeded the FC objective.

This beach has constantly been subjected to gross pollution and was polluted 6 of the 9 most recent years (and possibly in 1969) for which there was information. It can be considered to be unacceptably contaminated for bathing purposes.

The water quality of Brantwood beach has exceeded the Health Unit's guidelines (Table XIII) every year from 1968 through to 1970. In 1970 it ranked second to the Mooney's Bay upstream beach, although its historical pattern of pollution placed it in a category much more susceptible to contamination.

BRANTWOOD BEACH

TABLE IX - Yearly Data 1962 to 1970.

Year	Geometric Mean per 100 ml	
	Total Coliforms (No. of samples in brackets)	Fecal Coliforms
1962	992.1 (5)	374.0 (5)
1963	271.5 (7)	48.1 (7)
1964	482.9 (9)	209.2 (9)
1965	422.5 (7)	244.6 (7)
1966	215.4 (9)	58.3 (9)
1967	2,057.2 (10)	891.0 (10)
1968	3,061.4 (16)	469.8 (16)
1969	621.0 (18)	-
1970	201.8 (74)	82.9 (78)

BRANTWOOD BEACH

TABLE X - Monthly 1970 Geometric Means.

Month	Geometric Mean per 100 ml	
	Total Coliforms (No. of samples in brackets)	Fecal Coliforms
May	274.4 (5)	18.6 (5)
June	176.2 (27)	82.7 (27)
July	257.4 (28)*	99.8 (30)
August	144.3 (14)	94.0 (16)

* two 8000+ total coliform counts
were excluded.

Strathcona Beach

Data since 1962 (Table I) indicated a continuous deterioration in quality over the years (370 TC/100 ml and 66.7 FC/100 ml in 1962) with OWRC criteria exceeded by 1964 (GM of 154.0 FC/100 ml). Significant increases in counts can be observed until 1968 where the water grossly exceeded OWRC objectives. In 1970, total coliform numbers decreased to 344.0/100 ml, the fecal coliform mean recorded at 151.4/100 ml still surpassed the safe bathing level.

The data suggested an improvement in quality between 1968 and 1970 although the improvement was insufficient to render the beach waters safe. In 1970 alone the analyses of samples showed the water to have been polluted fecally (Table II and fecal coliforms) from May through to and including July. August data showed recovery during the early part of the month with some very very low counts (55 TC and 10 FC per 100 ml). However, the last samples taken August 31 recorded the highest counts of the year indicating considerable exposure to pollution discharges. An attempt to control pollution in August was indicated by the fall in TC and FC levels.

The 1970 data exceeded the Health Unit's recommended limit with 66.7% of the samples showing fecal coliform levels higher than 100 FC/100 ml. This beach is the furthest downstream on the Rideau River and suffered severely from upstream inputs making it the worst of these beaches.

STRATHCONA BEACH

TABLE I - Yearly Data 1962 to 1970.

Year	Geometric Mean per 100 ml	
	Total Coliforms (No. of samples in brackets)	Fecal Coliforms
1962	370.3 (5)	66.7 (5)
1963	484.7 (8)	85.8 (8)
1964	753.1 (7)	154.0 (7)
1965	1,938.1 (5)	367.0 (6)
1966	1,115.2 (11)	530.9 (11)
1967	1,958.8 (12)	1,034.6 (12)
1968	3,028.3 (15)	1,006.0 (15)
1970	344.0 (28)	151.4 (30)

STRATHCONA BEACH

TABLE II - Monthly 1970 Geometric Means.

Month	Geometric Mean per 100 ml	
	Total Coliforms (No. of samples in brackets)	Fecal Coliforms
May	216.3 (2)	109.5 (2)
June	573.2 (8)	401.8 (8)
July	488.4 (12)	182.5 (12)
August	100.9 (6)*	46.8 (8)

* This mean excludes two values of 8000+ total coliforms per 100 ml sample, which were collected after a rain.

OTTAWA RIVER BEACHES

Britannia Beach

Data available from 1962 to 1964 (Table V) indicates reasonably good conditions with maximum GM's of 235 TC and 81.3 FC/100 ml. However, a steady deterioration in quality was noted and hazardous conditions existed from 1965 to 1969. Fecal coliform means were approximately at the 200 FC/100 ml density during this period, except in 1968, and then total coliforms approached the 1000 mark at 980.9 TC/100 ml.

Considering the amount of data in 1970 (87 samples), a definite improvement in quality was somehow achieved with acceptable overall quality evident.

The monthly data (Table VI) showed that this beach was not significantly polluted in 1970. The confidence limits of the total and fecal coliform means did not exceed the recommended limits (1000 TC and 100 FC) in June and August. In July the upper limit was 105.8 FC/100 ml, marginally higher than the criteria. Fluctuations in individual sampling days' results however showed that nearby sources of pollution must exist and periodically influenced the daily water quality without exerting a sustained long-term influence.

Because this beach was badly polluted (1965 to 1969), it should be intensively sampled throughout the bathing season and activities should be regulated according to the results obtained. Sampling, monitoring and subsequent control of the pollution sources should also be part of this regulatory activity.

The Health Unit's recommended limit was exceeded by this 1970 data, with 34.4% of the samples greater than 100 FC per 100 ml.

This recreational water in 1970 was better than that of Westboro beach and the beaches on the Rideau River except for Mooney's Bay. Its history indicates however that it can be quite severely polluted.

BRITANNIA BEACH

TABLE V - Yearly Data 1962 to 1970.

Year	Geometric Mean per 100 ml		
	Total Coliforms (No. of samples in brackets)	Fecal Coliforms	
1962	235.0 (6)		81.3 (6)
1963	127.1 (5)		8.6 (5)
1964	228.2 (9)		55.3 (9)
1965	378.6 (12)		218.2 (12)
1966	1,240.1 (9)		202.8 (10)
1967	453.7 (15)		195.2 (15)
1968	980.9 (32)		68.0 (32)
1969	690.0 (9)		200.0 (9)
1970	186.3 (87)		51.0 (87)

BRITANNIA BEACH

TABLE VI - Monthly 1970 Geometric Means.

Month	Geometric Mean per 100 ml	
	Total Coliforms (No. of samples in brackets)	Fecal Coliforms
May	216.9 (5)	39.8 (5)
June	173.5 (29)	47.5 (29)
July	204.0 (28)	59.8 (28)
August	179.4 (25)	48.7 (25)

Westboro Beach

Data from 1958 to 1964 (Table III) indicated generally acceptable water quality with means ranging from lows of 13.7 TC and 17.5 FC/100 ml to highs of 303.9 TC and 81.6 FC per 100 ml. Both pollution indicators increased in density since 1964 and on two occasions (1967 FC 186.1/100 ml and 1969 FC 172.1/100 ml) the fecal coliform means exceeded the 100 FC GM level. Total coliforms never reached the 1000 TC GM level, and 874.1 TC/100 ml in 1967 was the highest mean recorded. The trend toward considerable improvement in quality so evident at Brighton, Brantwood and possibly Strathcona (no 1969 data) between 1968 and 1969 was not seen in data from Westboro beach.

During 1970 (Table IV), fecal coliform levels were very high in June and July and though means met the objectives, the upper confident limits on these means (157.3 and 159.6 FC per 100 ml respectively) suggested poor conditions. In August however, considerable water quality improvement was noticed which suggests that some sources of pollution may have been controlled.

Westboro beach was generally free from hazardous levels of fecal pollution in 1970. Nevertheless, some source(s) of fecal input would seem to exist close to the beach sampling

points and these should be carefully monitored during the bathing season.

Because this beach was subject to marginal pollution in some months, weekend pollution levels would be hazardous since in recent years both indicators have climbed close (or surpassed in the case of FC) to the safe bathing levels.

Thirty-six percent (36.4%) of the 1970 samples exceeded the recommended limit used by the Health Unit.

WESTBORO BEACH

TABLE III - Yearly Data 1958 to 1970.

Year	Geometric Mean per 100 ml		
	Total Coliforms (No. of samples in brackets)	Fecal Coliforms	
1958	13.7 (8)		-
1961	38.6 (5)		-
1962	279.5 (6)	81.6	(6)
1963	303.9 (5)	17.5	(5)
1964	131.3 (9)	24.6	(9)
1965	351.5 (24)	38.7	(13)
1966	448.9 (9)	64.4	(10)
1967	874.1 (23)	186.1	(23)
1968	483.3 (29)	75.4	(29)
1969	689.5 (6)	172.1	(6)
1970	299.3 (82)	56.2	(84)

WESTBORO BEACH

TABLE IV - Monthly 1970 Geometric Means.

Month	Geometric Mean per 100 ml		
	Total Coliforms (No. of samples in brackets)	Fecal Coliforms	
May	203.3 (3)*		8.2 (5)
June	492.5 (27)		94.3 (27)
July	310.3 (29)**		84.1 (29)**
August	167.7 (23)		27.9 (23)

* excludes two 11,000+ total coliform values

** excludes one 8,000+ total coliform and one 160+ fecal coliform value.

TABLE XIII - Health Unit Standards

<u>Beach</u>	Samples showing FC greater than 100/100 ml.*	
	<u>%</u>	<u>(Total No. of Samples)</u>
Strathcona	66.7	(30)
Westboro	36.4	(85)
Brittania	34.4	(87)
Brighton	53.5	(71)
Brantwood	35.8	(78)
Mooney's Bay	24.7	(93)

* over 10% is unacceptable.

General Comments

Rain has the affect of resuspending sediments, increases soil and road runoff and scours outfalls contributing to 10- to 100- fold increases in bacterial counts over those during dry periods.

Rainfall for 1970 was plotted in Graph #I. On six (6) occasions, the precipitation was greater than 0.5 inches. The effect on bacterial counts in most cases was typical and was exerted one and usually two days following rain. The one occasion where results were available for the day on which it rained, the immediate affect was that of diluting or lowering the counts.

This was considered an important factor in predicting hazardous conditions and should be taken into account when managing these marginally polluted or polluted beaches.

On weekends there are additional probable sources of pollution from the bathers themselves and from the resuspension of bottom sediments. Since the water quality was only assessed on weekdays, it must be concluded that, on weekends and holidays when the beaches are undoubtedly intensively used, the beaches are much more polluted. Considering the levels of fecal coliforms at all six beaches, there is little doubt that hazardous water quality exist on weekends.

Prior to 1968 the beaches were rapidly deteriorating in water quality. Westboro beach continued to deteriorate with some improvement in quality in 1970 over former years. Some beaches improved markedly in 1968 (Britannia and Mooney's Bay) and others in 1969 (Brighton and Brantwood). This suggests that some efforts were made at that time to curtail sources of contamination. In some cases parametric levels fell by roughly a factor of ten and showed some success. Exactly what efforts were made should be discovered and redoubled on an interim basis until sources can be found and eliminated.

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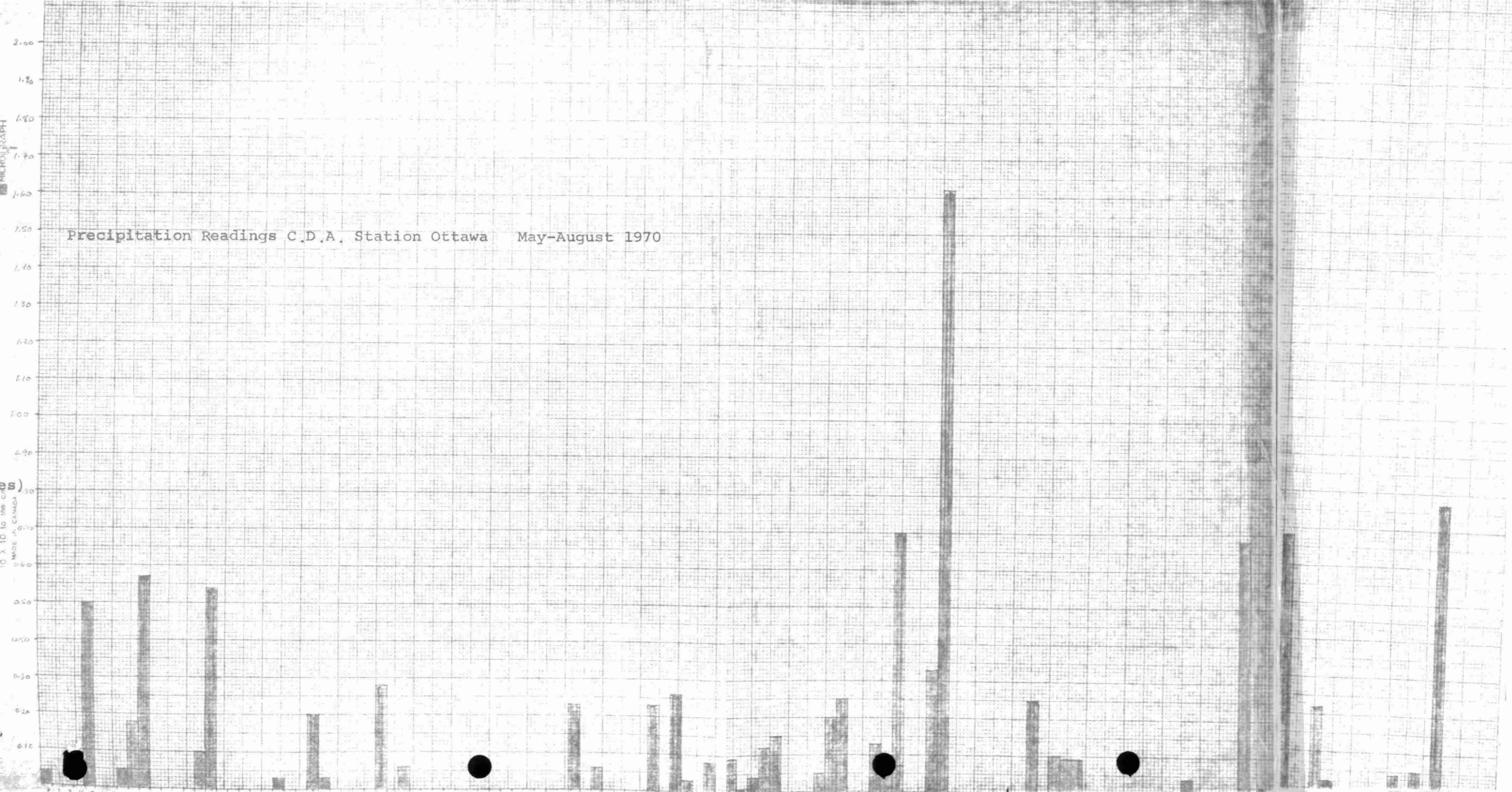
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